Section: Surgery

Systematic Review Article

LAPAROSCOPIC VERSUS OPEN APPENDECTOMY: A SYSTEMATIC REVIEW OF POSTOPERATIVE OUTCOMES

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ABSTRACT

Background: Acute appendicitis is one of the most common surgical emergencies worldwide. Surgical removal of the appendix can be performed using either laparoscopic appendectomy (LA) or open appendectomy (OA). Over the past few decades, laparoscopic techniques have gained popularity due to perceived benefits such as reduced postoperative pain, shorter hospital stay, and quicker recovery. However, concerns remain regarding operative time, cost, and complications such as intra-abdominal abscess formation. Although numerous studies have compared these approaches, the results remain inconsistent. A systematic review is therefore essential to comprehensively evaluate and synthesize current evidence regarding postoperative outcomes between the two techniques. **Objectives:** This systematic review aims to compare postoperative outcomes between laparoscopic and open appendectomy. Specifically, it evaluated differences in postoperative pain, duration of hospital stays, operative time, postoperative complications (including wound infection and intra-abdominal abscess), time to return to normal activities, and overall recovery and morbidity.

Materials and Methods: This systematic review included original research studies, randomized controlled trials, cohort studies, comparative observational studies, cross-sectional studies, case-control studies, case reports comparing laparoscopic and open appendectomy and reporting at least one postoperative outcome. A comprehensive literature search was conducted in PubMed, Scopus, Web of Science, Cochrane Library, and Google Scholar using relevant keywords. Articles published from the year 2000 were included in results. Studies were selected through independent screening of titles, abstracts, and full texts, and the selection process was documented using a PRISMA flow diagram. Data regarding the type of intervention (laparoscopic or open appendectomy), postoperative outcomes (including pain, hospital stay, operative time, complications, and recovery), and key findings were extracted and synthesized.

Results: Laparoscopic appendectomy was associated with shorter hospital stay, reduced postoperative pain, fewer wound infections, faster return to normal activity/work, and improved cosmetic or quality-of-life outcomes. However, it generally required longer operative time and was sometimes associated with higher costs. Overall complication rates were largely comparable, although intra-abdominal abscesses were occasionally more frequent after laparoscopy, particularly in complicated appendicitis.

Conclusion: Overall, laparoscopic appendectomy offers shorter hospital stay, fewer wound infections, less pain, faster recovery, and better cosmetic outcomes, but may involve longer operative time, higher costs, and increased abscess risk in complicated cases. Further large, well-designed studies are needed to confirm its long-term benefits, safety, and cost-effectiveness.

Keywords: Acute appendicitis, laparoscopic appendectomy, open appendectomy, postoperative outcomes, surgical complications.

INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies worldwide and appendectomy remains the standard treatment for its management. Traditionally, open appendectomy (OA) has been the conventional surgical approach. However, laparoscopic appendectomy (LA) has increasingly gained popularity due to advances in minimally invasive surgery. Both procedures are widely performed, yet debate continues regarding the superiority of one technique over the other in terms of postoperative outcomes.

Laparoscopic appendectomy is considered less invasive and has been associated with reduced postoperative pain, shorter hospital stays, faster recovery, earlier return to daily activities, and lower wound infection rates. In contrast, open appendectomy is often associated with shorter operative time, lower cost, and technical simplicity, particularly in complicated appendicitis. Several original studies have compared these two approaches with varying results regarding operative duration, postoperative complications, intra-abdominal abscess formation, analgesic requirement, and overall patient recovery.

A large American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) database study of 32,683 patients found that laparoscopic appendectomy (LA) was associated with lower overall morbidity and fewer surgical site infections compared with open appendectomy (OA). However, patients with complicated appendicitis had a higher risk of organ-space infection after LA. Overall, LA provided better postoperative outcomes despite slightly longer operative times (Ingraham AM et al., 2010).[1]

This review aims to evaluate and compare postoperative complications, length of hospital stays, postoperative pain, wound infection, recovery time, and other clinical outcomes associated with laparoscopic versus open appendectomy in patients with acute appendicitis.

Objectives

This systematic review aims to compare postoperative outcomes between laparoscopic and open appendectomy. It specifically assessed differences in postoperative pain, length of hospital stays, operative duration, postoperative complications such as wound infection and intra-abdominal abscess, time required to resume normal activities, and overall recovery and morbidity.

MATERIALS AND METHODS

This systematic review followed PRISMA guidelines and comprehensive literature searched PubMed/MEDLINE, Scopus, Web of Science, Cochrane Library, and Google Scholar using relevant keywords like acute appendicitis, laparoscopic appendectomy, open appendectomy, postoperative outcomes, surgical complications. Articles published from the year 2000 were included in results. Eligible study designs included original research studies, randomized controlled trials, cohort studies, comparative observational studies, cross-sectional studies, case-control studies, case reports comparing laparoscopic and open appendectomy and reporting at least one postoperative outcome. Articles without extractable data, lacked clear outcome measures or evaluable results, conference abstracts, editorials, letters were excluded. Titles, abstracts, and full texts were independently screened by two reviewers, with disagreements resolved through discussion. Data extraction and quality assessment were performed independently using standardized tools appropriate to study design. Data were extracted using a standardized format, and the findings were synthesized narratively.

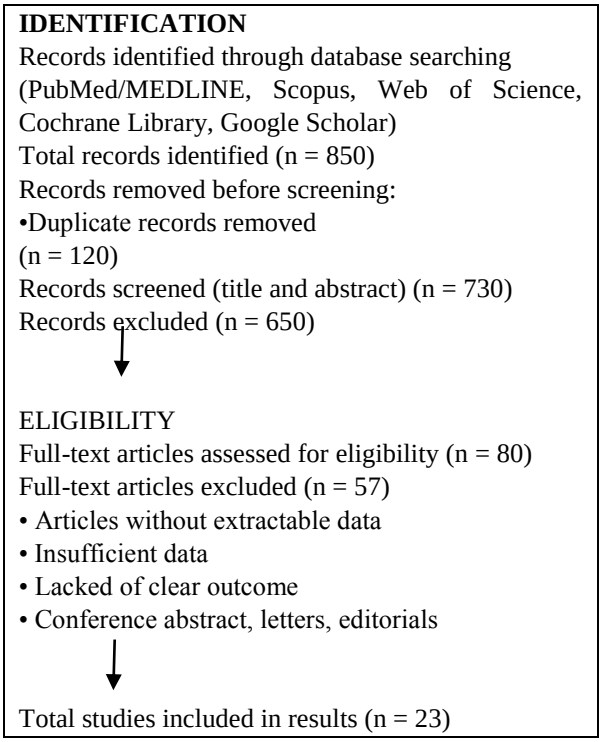

Figure 1: PRISMA flow diagram of study selection process

RESULTS

Katkhouda N et al. (2005) studied 247 patients undergoing laparoscopic or open appendectomy. Complication rates were similar (18.5% vs. 17%), with no mortality, while laparoscopic surgery had a longer operative time (80 vs. 60 min; P = 0.000). Pain, analgesic use, diet resumption, hospital stay, and activity scores were comparable. At 2 weeks, laparoscopic appendectomy significantly improved physical health and general Short Form-36 Health Survey (SF-36) scores. Complication rates in acute and complicated appendicitis were also similar (P =

0.181). Overall, laparoscopy offered mainly short-term quality-of-life benefits.[2]

Kocataş A et al. (2013) conducted a randomized trial of 96 patients with uncomplicated acute appendicitis (50 laparoscopic, 46 open). No significant differences were observed in postoperative septic complications, hospital stay, pain scores, or quality-of-life scores between groups. Thus, laparoscopic appendectomy showed no clear advantage over open surgery in these outcomes.[3]

Rashid A et al. (2013) conducted a randomized study of 100 patients with appendicular phlegmon undergoing interval appendectomy. Laparoscopic surgery took longer (57.64 vs. 33.9 min; P < 0.05) but resulted in lower postoperative pain (5.14 vs. 6.01; P < 0.05), shorter ileus and hospital stay, and earlier return to work (P < 0.05). Concomitant pathology was more frequent laparoscopically (16% vs. 2%). Overall, laparoscopy showed several postoperative advantages over open surgery.[4]

Kumar S et al. (2016) prospectively compared laparoscopic and open appendectomy in 212 patients with acute appendicitis. Laparoscopic appendectomy required longer operative time (44.57 ± 6.68 vs. 36.34 ± 7.47 min; P < 0.05) but resulted in lower postoperative pain scores, shorter hospital stay (2.63 ± 0.60 vs. 3.26 ± 0.68 days; P < 0.05), and fewer surgical-site infections (3.8% vs. 14%; P < 0.05). Overall, laparoscopy provided better postoperative outcomes despite longer operative time.[5]

Quezada F et al. (2015) retrospectively analyzed 227 patients with appendicitis complicated by peritonitis; 97 underwent laparoscopic appendectomy, with 13 conversions to open surgery (13%). Laparoscopy required longer operative time but reduced hospital stay (P < 0.05), with no significant differences in intra-abdominal abscess, surgical-site infection, or prolonged ileus. Multivariate analysis showed lower odds of surgical complications with laparoscopy (Odds Ratio [OR] 0.301; P = 0.036). Thus, laparoscopic appendectomy was a safe approach for peritonitis.[6]

Pokala N et al. (2007) retrospectively compared laparoscopic (LA; n=43) and open appendectomy (OA; n=61) for complicated appendicitis. LA had longer operative time (100.5 ± 36.2 vs. 81.5 ± 29.5 min; P=0.03) and lower blood loss (21 vs. 33 mL; P=0.01), with similar hospital stay (6 vs. 6 days; P=0.7) and overall complications (39.5% vs. 34.4%; P=0.54). Intra-abdominal abscesses were more frequent after LA (14% vs. 0%; P=0.04), while wound infections were fewer (2.3% vs. 8.2%). Conversion occurred in 18.6% of LA cases.[7]

Biondi A et al. (2016) retrospectively evaluated 593 patients with acute appendicitis (310 open, 283 laparoscopic). Laparoscopic appendectomy reduced hospital stay (2.7 ± 2.5 vs. 1.4 ± 0.6 days), analgesic requirement, and time to normal activity (11.5 ± 3.1 vs. 16.1 ± 3.3 days), but required longer operative time (54.9 ± 14.2 vs. 31.36 ± 11.13 min). Wound infection was significantly lower with laparoscopy (1.4% vs. 10.6%; P < 0.001), although treatment cost was €150 higher. Overall, laparoscopy provided better postoperative outcomes with only modest additional cost.[8]

Utpal D (2005) compared laparoscopic (LA; n=100) and open appendectomy (OA; n=179) in 279 patients. LA had fewer overall complications (15% vs. 31.8%; P < 0.001) and a shorter hospital stay (3 vs. 5 days; P < 0.0001), but slightly longer operative time (28 vs. 25 min; P < 0.05). Conversion to open surgery occurred in 6% of LA cases. Overall, LA provided better postoperative recovery and fewer wound-related complications with comparable operative cost.[9]

Peiser JG & Greenberg D (2002) retrospectively compared 194 patients undergoing laparoscopic (LA) or open appendectomy (OA). Complication rates and antibiotic use were similar. Operative time was 57.3 vs. 62.4 minutes for LA and OA, respectively (P = 0.075), while hospital stay was 2.5 vs. 2.7 days. LA was associated with higher operative costs and showed no significant overall advantage over OA.[10]

Guller U et al. (2004) analyzed 43,757 appendectomy cases from the 1997 Nationwide Inpatient Sample. Compared with open appendectomy, laparoscopic surgery reduced hospital stay (2.06 vs. 2.88 days; P < 0.0001), infections (OR 0.50; P < 0.0001), gastrointestinal complications (OR 0.80; P = 0.02), and overall complications (OR 0.84; P = 0.002), while increasing routine discharge (OR 3.22; P < 0.0001). Thus, laparoscopic appendectomy was associated with better inpatient outcomes.[11]

Nepal YJ et al. (2023) compared 52 patients undergoing laparoscopic or open appendectomy (26 per group). Laparoscopy had longer post-procedure recovery time (30 vs. 20 min; P < 0.01) and higher cost (Nrs. 26,295 vs. 19,575; P < 0.01). Operative time, postoperative pain, and complication rates were comparable. Thus, laparoscopic appendectomy was more costly with longer recovery, and procedure selection may depend on patient preference.[12]

Han J et al. (2022) retrospectively evaluated 239 children (<12 years) undergoing laparoscopic appendectomy using Hybrid Appendectomy (HA), Single-Port LA (SPLA), or Multi-Port LA (MPLA) approaches. In uncomplicated appendicitis, HA had a shorter operative time than MPLA (31.77 vs. 40.09 min; P < 0.001), while 30-day complication rates were similar (7.6% vs. 7.8% vs. 5.4%; P = 0.841). HA also demonstrated faster functional recovery. Overall, HA was safe and effective for uncomplicated appendicitis.[13]

Moberg AC et al. (2005) randomized 163 patients to laparoscopic (LA) or open appendectomy (OA). Full recovery was similar (9 vs. 11 days; P = 0.225), as were operative time (55 vs. 60 min; P = 0.416), complications (8.6% vs. 11.0%; P = 0.696), and hospital stay (2 days each; P = 0.192). Functional

status was significantly better with LA at 7–10 days (P = 0.045), suggesting improved early physical recovery.[14]

Pedersen AG et al. (2001) randomized 583 patients to laparoscopic (n=282) or open appendectomy (n=301). Hospital stay was similar (median 2 days), but laparoscopy enabled faster return to normal activity (7 vs. 10 days) and work (10 vs. 16 days), with fewer wound infections (P < 0.03) and better cosmesis (P < 0.001). Operative time was longer (60 vs. 40 min), while intraperitoneal abscesses were more frequent (5% vs. 1%). Overall, laparoscopy promoted faster recovery and better cosmetic outcomes.[15]

Wu HS et al. (2011) retrospectively analyzed 1,366 patients with acute appendicitis. Compared with open appendectomy (OA), laparoscopic appendectomy (LA) had lower complication rates (5.8% vs. 9.5%; P = 0.013), fewer wound infections (4.2% vs. 8.6%; P = 0.001), and shorter hospital stay (4.06 ± 1.84 vs. 4.60 ± 3.64 days; P = 0.001), but higher costs (NT$37,567 vs. NT$32,670; ~15% higher). LA was safe and effective, with particular benefits in complicated and elderly patients.[16]

Ali R et al. (2018) conducted a prospective randomized controlled trial and compared laparoscopic appendectomy (LA) and open appendectomy (OA) in 126 patients with acute appendicitis. LA had a significantly longer operative time (56±24 min vs. 39±8 min; p<0.0001) but a shorter hospital stay (34±13 hr vs. 40±11 hr; p=0.01). Postoperative wound infection rates were similar in both groups. Overall, LA reduced hospitalization duration but was technically more demanding than OA.[17]

According to Yau KK et al. (2007), a retrospective analysis of patients older than 14 years with complicated appendicitis compared laparoscopic appendectomy (LA) and open appendectomy (OA). Among 244 identified cases, 175 underwent LA and 69 underwent OA. LA was associated with a shorter operative time (55 vs. 70 min; p<0.001), reduced hospital stay (5 vs. 6 days; p < 0.001), and a lower rate of wound infection (0.6% vs. 10%; p=0.001). Rates of intra-abdominal collection were comparable between the groups, with no reported mortality. The study concluded that LA is a safe and effective approach for complicated appendicitis, offering better postoperative outcomes than OA.[18]

According to Tanaka S et al. (2007), a retrospective review of 95 patients with acute appendicitis compared laparoscopic appendectomy (LA) and open appendectomy (OA). LA was associated with a longer operative time (80 vs. 63 min; p=0.012) but showed faster recovery from postoperative pain and fever, lower wound infection rates (6% vs. 27%; p=0.01), and shorter hospital stay (6.7 vs. 14.4 days; p=0.04). Although serious complications occurred in two LA cases, the study concluded that LA generally promotes quicker postoperative recovery despite technical challenges and longer surgery duration.[19]

Long KH et al. (2001) randomized 198 patients to laparoscopic or open appendectomy. Laparoscopy required longer operative time (107 vs. 91 min; P < 0.01) but resulted in faster diet resumption (1.6 vs. 2.3 days), shorter parenteral analgesia (1.6 vs. 2.2 days), lower narcotic use (14 vs. 34 mg; P = 0.001), shorter hospital stay (2.6 vs. 3.4 days; P < 0.01), and earlier return to activity (14 vs. 21 days; P < 0.02). Total costs were lower with laparoscopy ($11,577 vs. $13,965), despite similar direct costs and morbidity.[20]

De U (2005) studied 279 patients with acute appendicitis and found that laparoscopic appendectomy had fewer complications (15% vs. 31.8%; P < 0.001) and a shorter hospital stay (3 vs. 5 days; P < 0.0001) than open surgery. Although operative time was slightly longer (28 vs. 25 min; P < 0.05), laparoscopy provided faster recovery, earlier return to work, fewer wound infections, and better cosmesis, with comparable operative costs.[21]

Wei HB et al. (2010) randomized 220 patients to laparoscopic (LA; n=112) or open appendectomy (OA; n=108). Operative time was similar (30 ± 15.2 vs. 28.7 ± 16.3 min; P > 0.05), while LA reduced hospital stay (4.1 ± 1.5 vs. 7.2 ± 1.7 days; P < 0.05), time to diet (20.2 ± 12.4 vs. 36.5 ± 10 hr), normal activity (9.1 ± 4.2 vs. 13.7 ± 5.8 days), and work (21.2 ± 3.5 vs. 27.7 ± 4.9 days; all P < 0.05). Wound infections (0 vs. 14), intra-abdominal abscesses (2 vs. 9), and postoperative ileus (0% vs. 7.4%) were also lower with LA (P < 0.05). Overall, LA provided better recovery and fewer complications.[22]

Nazir A et al. (2019) randomized 130 patients with perforated appendicitis to laparoscopic or open appendectomy. Wound infection was significantly lower with laparoscopy (10.77% vs. 27.69%; P = 0.01), while operative time was shorter (46.98 ± 2.99 vs. 53.02 ± 2.88 min; P < 0.000). Hospital stay was comparable (4.38 ± 1.09 vs. 4.18 ± 0.77 days; P = 0.23). Overall, laparoscopic appendectomy reduced wound infections and operative time.[23]

Horvath P et al. (2017) retrospectively evaluated 1,516 patients with complicated appendicitis (926 open, 590 laparoscopic). Laparoscopy had slightly longer operative time (64.5 vs. 60 min; P = 0.002) but a significantly shorter hospital stay (P < 0.000). Surgical-site infections occurred only after open surgery (38 vs. 0 cases), whereas intra-abdominal abscesses were more frequent with laparoscopy (10 vs. 2; P = 0.002). Postoperative ileus and stump insufficiency were comparable. Overall, laparoscopy was safe and feasible but required attention to abscess prevention.[24]

Table 1: Studies Included and Key Findings Comparing Laparoscopic and Open Appendectomy

Author and year	Key findings
Katkhouda N et al. (2005)	Complication rates were similar (18.5% vs. 17%), with no mortality. Laparoscopic surgery had a longer operative time (80 vs. 60 min; P = 0.000). At 2 weeks, laparoscopic appendectomy significantly improved physical health and general SF-36 scores.
Kocataş A et al. (2013)	No significant differences were observed in postoperative septic complications, hospital stay, pain scores, or quality-of-life scores between groups.
Rashid A et al. (2013)	Laparoscopic surgery took longer (57.64 vs. 33.9 min; P < 0.05) but resulted in lower postoperative pain (5.14 vs. 6.01; P < 0.05), shorter ileus and hospital stay, and earlier return to work (P < 0.05).
Kumar S et al. (2016)	Laparoscopic appendectomy required longer operative time (44.57 ± 6.68 vs. 36.34 ± 7.47 min; P < 0.05) but resulted in lower postoperative pain scores, shorter hospital stay (2.63 ± 0.60 vs. 3.26 ± 0.68 days; P < 0.05), and fewer surgical-site infections (3.8% vs. 14%; P < 0.05).
Quezada F et al. (2015)	Laparoscopy reduced hospital stay (P < 0.05), with no significant differences in intra-abdominal abscess, surgical-site infection, or prolonged ileus. Lower odds of surgical complications were observed (OR 0.301; P = 0.036).
Pokala N et al. (2007)	LA had longer operative time (100.5 ± 36.2 vs. 81.5 ± 29.5 min; P = 0.03) and lower blood loss (21 vs. 33 mL; P = 0.01). Intra-abdominal abscesses were more frequent after LA (14% vs. 0%; P = 0.04), while wound infections were fewer (2.3% vs. 8.2%).
Biondi A et al. (2016)	Laparoscopic appendectomy reduced hospital stay, analgesic requirement, and time to normal activity. Wound infection was significantly lower (1.4% vs. 10.6%; P < 0.001), although treatment cost was €150 higher.
Utpal D (2005)	LA had fewer overall complications (15% vs. 31.8%; P < 0.001) and a shorter hospital stay (3 vs. 5 days; P < 0.0001), but slightly longer operative time (28 vs. 25 min; P < 0.05).
Peiser JG & Greenberg D (2002)	Complication rates and antibiotic use were similar. Operative time was 57.3 vs. 62.4 minutes (P = 0.075) for LA and OA, while hospital stay was 2.5 vs. 2.7 days. LA was associated with higher operative costs and showed no significant overall advantage.
Guller U et al. (2004)	Laparoscopic surgery reduced hospital stay (2.06 vs. 2.88 days; P < 0.0001), infections (OR 0.50; P < 0.0001), gastrointestinal complications (OR 0.80; P = 0.02), and overall complications (OR 0.84; P = 0.002), while increasing routine discharge (OR 3.22; P < 0.0001).
Nepal YJ et al. (2023)	Laparoscopy had longer post-procedure recovery time (30 vs. 20 min; P < 0.01) and higher cost (Nrs. 26,295 vs. 19,575; P < 0.01). Operative time, postoperative pain, and complication rates were comparable.
Han J et al. (2022)	In uncomplicated appendicitis, HA had a shorter operative time than MPLA (31.77 vs. 40.09 min; P < 0.001), while 30-day complication rates were similar (7.6% vs. 7.8% vs. 5.4%; P = 0.841).
Moberg AC et al. (2005)	Full recovery was similar (9 vs. 11 days; P = 0.225), as were operative time, complications, and hospital stay. Functional status was significantly better with LA at 7–10 days (P = 0.045).
Pedersen AG et al. (2001)	Hospital stay was similar (median 2 days), but laparoscopy enabled faster return to normal activity (7 vs. 10 days) and work (10 vs. 16 days), with fewer wound infections (P < 0.03) and better cosmesis (P < 0.001).
Wu HS et al. (2011)	LA had lower complication rates (5.8% vs. 9.5%; P = 0.013), fewer wound infections (4.2% vs. 8.6%; P = 0.001), and shorter hospital stay (4.06 ± 1.84 vs. 4.60 ± 3.64 days; P = 0.001), but higher costs (~15% higher).
Ali R et al. (2018)	LA had a longer operative time (56 ± 24 vs. 39 ± 8 min; P < 0.0001) but a shorter hospital stay (34 ± 13 vs. 40 ± 11 hr; P = 0.01). Postoperative wound infection rates were similar.
Yau KK et al. (2007)	LA was associated with a shorter operative time (55 vs. 70 min; P < 0.001), reduced hospital stay (5 vs. 6 days; P < 0.001), and a lower rate of wound infection (0.6% vs. 10%; P = 0.001).
Tanaka S et al. (2007)	LA had a longer operative time (80 vs. 63 min; P = 0.012) but showed faster recovery from postoperative pain and fever, lower wound infection rates (6% vs. 27%; P = 0.01), and shorter hospital stay (6.7 vs. 14.4 days; P = 0.04).
Long KH et al. (2001)	Laparoscopy required longer operative time (107 vs. 91 min; P < 0.01) but resulted in faster diet resumption, shorter parenteral analgesia, lower narcotic use (14 vs. 34 mg; P = 0.001), shorter hospital stay (2.6 vs. 3.4 days; P < 0.01), and earlier return to activity (14 vs. 21 days; P < 0.02).
De U (2005)	LA had fewer complications (15% vs. 31.8%; P < 0.001) and a shorter hospital stay (3 vs. 5 days; P < 0.0001). Although operative time was slightly longer (28 vs. 25 min; P < 0.05), laparoscopy provided faster recovery, earlier return to work, fewer wound infections, and better cosmesis.
Wei HB et al. (2010)	LA reduced hospital stay (4.1 ± 1.5 vs. 7.2 ± 1.7 days; P < 0.05), time to diet, normal activity, and work (all P < 0.05). Wound infections (0 vs. 14), intra-abdominal abscesses (2 vs. 9), and postoperative ileus (0% vs. 7.4%) were also lower with LA (P < 0.05).
Nazir A et al. (2019)	Wound infection was significantly lower with laparoscopy (10.77% vs. 27.69%; P = 0.01), while operative time was shorter (46.98 ± 2.99 vs. 53.02 ± 2.88 min; P < 0.000). Hospital stay was comparable (4.38 ± 1.09 vs. 4.18 ± 0.77 days; P = 0.23).
Horvath P et al. (2017)	Laparoscopy had slightly longer operative time (64.5 vs. 60 min; P = 0.002) but a significantly shorter hospital stay (P < 0.000). Surgical-site infections occurred only after open surgery (38 vs. 0 cases), whereas intra-abdominal abscesses were more frequent with laparoscopy (10 vs. 2; P = 0.002).

CONCLUSION

Katkhouda N et al. (2005) concluded that laparoscopic appendectomy provided no major advantage over open surgery except improved 2-week quality-of-life scores. It required longer operative time, and the choice of technique could be guided by surgeon or patient preference.[2]

Kocataş A et al. (2013) concluded that laparoscopic appendectomy offered no significant benefit over open surgery regarding hospital stay, postoperative pain, or quality of life in uncomplicated appendicitis.[3]

Kumar S et al. (2016) concluded that laparoscopic appendectomy resulted in fewer wound infections, lower analgesic requirements, and shorter hospital stays than open surgery, despite a longer operative time, supporting laparoscopy as the preferred approach for acute appendicitis.[5]

Quezada F et al. (2015) concluded that laparoscopic and open appendectomy had comparable complication rates in appendicitis with peritonitis.

Laparoscopic appendectomy was considered a safe surgical approach in these patients.[6]

Biondi A et al. (2016) concluded that laparoscopic appendectomy is safe and effective, offering shorter hospital stay, reduced analgesic use, faster recovery, and fewer wound infections, with only a modest increase in treatment cost.[8]

Utpal D (2005) concluded that laparoscopic appendectomy shortened hospital stay and provided fewer wound infections, faster recovery, earlier return to work, and better cosmesis, with operative costs comparable to open surgery.[9]

Peiser JG & Greenberg D (2002) concluded that laparoscopic appendectomy had comparable complications, operative time, and hospital stay to open surgery but incurred higher costs, without providing significant overall clinical benefit.[10]

Guller U et al. (2004) concluded that laparoscopic appendectomy offered significant benefits over open surgery, including shorter hospital stay, higher rates of routine discharge, and lower postoperative morbidity.[11]

Nepal YJ et al. (2023) concluded that laparoscopic appendectomy involved longer postoperative recovery and higher costs than open surgery; therefore, the choice of technique may be guided by patient preference.[12]

Moberg AC et al. (2005) concluded that laparoscopic and open appendectomy had similar recovery times, although laparoscopic surgery showed better early physical activity.[14]

Pedersen AG et al. (2001) concluded that laparoscopic appendectomy had a similar hospital stay but provided fewer wound infections, faster recovery, earlier return to work, and better cosmetic outcomes than open appendectomy.[15]

Wu HS et al. (2011) concluded that laparoscopic appendectomy is as safe and effective as open surgery, with potential advantages in complicated appendicitis and elderly patients.[16]

Long KH et al. (2001) concluded that laparoscopic appendectomy offered modest clinical benefits and lower overall treatment costs than open surgery, with total savings of at least $2,000 in over 60% of simulations.[20]

De U (2005) concluded that laparoscopic appendectomy reduced hospital stay and wound infections, while promoting faster recovery, earlier return to work, and better cosmesis, with operative costs comparable to open surgery.[21]

Wei HB et al. (2010) concluded that laparoscopic appendectomy is a minimally invasive and effective approach, offering better cosmesis, faster recovery, and fewer complications. It can be considered a suitable routine treatment for acute appendicitis.[22]

Nazir A et al. (2019) concluded that laparoscopic appendectomy resulted in fewer surgical-site infections and a shorter operative time than open appendectomy.[23]

Horvath P et al. (2017) concluded that laparoscopic appendectomy is safe and feasible for complicated appendicitis, although it may increase the risk of intra-abdominal abscess. Proper specimen retrieval, stump management, and careful abdominal irrigation may help reduce this risk.[24]

Overall, the evidence suggests that laparoscopic appendectomy is a safe and effective alternative to open appendectomy, with advantages including shorter hospital stay, fewer wound infections, reduced pain, faster recovery, earlier return to activity, and better cosmetic or quality-of-life outcomes. However, laparoscopy may require longer operative time and incur higher costs, with a potential increased risk of intra-abdominal abscess in complicated cases. Further well-designed, large-scale randomized studies with long-term follow-up are needed to clarify its comparative benefits, cost-effectiveness, and safety across different appendicitis subgroups.

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